





matrix 200 is similar to the first level quality matrix 100 in that the CTQs 202 are related to KCPs 204 through interaction weights 206. Third and subsequent levels of quality matrices may be utilized as necessary.

[0007] The relation between CTQs and KCPs can be described quantitatively through the use of transfer functions. For example, the system level CTQ of image quality is defined as a function of lamp brightness, lamp focal spot and lens clarity. The transfer functions can be used in the framework of QFD by replacing the high, medium, and low interaction weights with a mathematical sensitivity of each dependent CTQ to each KCP. The mathematical sensitivity is a quantitative value based on the transfer function and may correspond to the partial derivative of the transfer function relating the CTQ to the KCPs.

[0008] While existing QFD methods are useful, it is understood that improvements to QFD are desirable.

## Summary of Invention

[0009] An exemplary embodiment of the invention relates to a method, system, and storage medium for performing synchronous quality function deployment (QFD) over a computer network. The computer network includes a real-time server, a lightweight thin client server, a data storage device, and at least two client systems. The system comprises a QFD tool including: a Create New QFD session component; an Active QFD session component; a Finished QFD session component; and a Scheduled QFD session component. The lightweight server executes the QFD tool and the client systems access the QFD tool in real time via the real-time server. The Create New QFD session component includes instructions for establishing a new QFD session by a user. The Active QFD session component includes a listing of QFD sessions that are in progress. The Finished QFD session component enables a user to resurrect a completed QFD session. The Scheduled QFD session component enables a user to view all scheduled QFD sessions. The invention also includes a method and a storage medium.

[0010] Further aspects of the invention are disclosed herein. The above discussed and other features and advantages of the present invention will be appreciated and understood by those skilled in the art from the following detailed description and

drawings.

## Brief Description of Drawings

- [0011] Referring to the exemplary drawings wherein like elements are numbered alike in the several FIGURES:
- [0012] FIG. 1 is a diagram representing a high level house of quality and QFD values for a system;
- [0013] FIG. 2 is a diagram representing a lower level house of quality and QFD values for a subsystem of FIG. 1;
- [0014] FIG. 3 is an exemplary computer screen window illustrating a sample main menu as seen by a user upon logging onto the QFD tool;
- [0015] FIG. 4 is an exemplary computer screen window illustrating the Create New QFD Session component as seen by a user of the QFD tool;
- [0016] FIG. 5 is an exemplary computer screen window illustrating the Scheduled QFD Sessions component as seen by a user of the QFD tool;
- [0017] FIG. 6 is a flowchart illustrating a process for participating in an active QFD session;
- [0018] FIG. 7 is an exemplary computer screen window illustrating an active QFD session in progress as seen by a session facilitator; and
- [0019] FIG. 8 is an exemplary block diagram of a system for implementing the QFD tool.

## Detailed Description

- [0020] An exemplary embodiment of the present invention is a method, system, and storage medium for performing synchronous quality function deployment (QFD) over a computer network. The QFD tool of the invention may be performed utilizing real-time server technology such as IBM's Sametime™ server. Other tools such as E-Matrix software by MatrixOne, Inc. and Java Shared Data Toolkit™ (JSDKT) may be used to implement the invention. The QFD tool may be developed as an applet executing on a lightweight or thin-client server for communicating with users (also referred to as

client systems) and the real-time server. A secure network architecture is desirable for protecting the business entity's information from outside or unauthorized entities. Typical users of the QFD tool include business employees, management personnel, customers, supplier entities, etc.

[0021] FIG. 8 illustrates a system 800 for implementing the QFD tool. A user at one of client systems 802 logs on to the QFD tool using conventional means, and the real-time server 804 receives the information, verifying the identity and access level of the user. If approved, the server 804 registers the user with the Lightweight thin client server 806 for access to the QFD tool and QFD data. Components of the QFD tool include Create New QFD Session 808, Scheduled QFD Sessions 810, Active QFD Session 812, and Finished QFD Session 814. Upon logging onto the QFD tool, a user is presented with a main menu 300 as illustrated in FIG. 3. Menu options "New QFD" 302, "Active QFD" 304, "Finished QFD" 306, and "Scheduled QFD" 308 are displayed. "New QFD" option 302 corresponds to New QFD Session Component 808 and allows a user to create a new QFD session as described further in FIG. 4. "Active QFD" option 304 corresponds to Active QFD Session 812 component and allows a user to enter a QFD session in progress, provided the user has proper access permissions. This feature is described further herein. "Finished QFD" 306 option corresponds to Finished QFD Session 814 component and allows a user to resurrect an old QFD session. "Scheduled QFD" 308 option corresponds to Schedule QFD Sessions 810 component and allows a user to check a listing of QFD sessions that are currently scheduled by the QFD tool. This listing may provide specific information about the sessions such as a session identifier, the creator of the session, and the date and time of the session.

[0022] The New QFD Session component 808 will now be described. To create a new QFD session, a user selects New QFD 302 option from main menu 300 screen. The New QFD screen 400 is displayed and the user is prompted to provide information as shown in FIG. 4. Information requested from the user includes a QFD name or identifier 402, a password (if applicable for the QFD) 404, the start time 406 of the QFD session, and the end time 408. Selecting "OK" 410 will cause the QFD session to be created and stored in a computer storage location or memory. The QFD tool later identifies the name of the user who initiated the new QFD as the "creator" of the QFD session as shown and described further in FIGs. 6 and 7.

[0023]

FIG. 6 is a flowchart describing the process of participating in an active session enabled by the Active QFD Session 812 component of the QFD tool in an exemplary embodiment. Upon selecting the "Active QFD" 304 option on main menu 300, the user is presented with a list of active sessions. A sample Active Sessions screen 500 is displayed. Two active sessions are presented on screen 500 and include "Product A" which was created by J. Smith and is scheduled for December 4, 2002 at 8:30 a.m. and "Product B", created by H. Jones and is scheduled for December 4, 2002 at 8:45 a.m. The Product A and Product B items correspond to the QFD identifiers 402 of FIG. 4. The user logs onto a session at step 602. This may involve entering a password in block 502 if applicable depending on the business rules adopted by the business entity. The tool checks to see if the user entering the session is the 'creator' of the session at step 604. A creator is generally the individual who entered the QFD session in the system but may alternatively be an individual selected to be the facilitator of the session. Likewise, the creator and the facilitator may be one and the same person. If the person entering the session is the creator/facilitator for the session, the tool prompts the user to specify whether he/she would like to facilitate the session at step 606. If not, or alternatively, if the user entering the session is not the creator, the tool presents QFD information relating to the session created at step 608. QFD information may include the CTQ attributes and values as well as KCPs and values as shown generally in FIGs. 1 and 2 or may comprise other quality control information desirable. A sample active session and QFD information are shown in Active Session screen 700 of FIG. 7. Users can view an attendee list 701 of those online for the session. The attendee list provides the attendees' names and may also provide additional information such as the attendees' business roles, job titles, business affiliation, and geographic locations to name a few. The session members who have entered the session may exchange data and objects such as applications, files, and documents at step 610. Additionally, data can be in various formats including text, graphics, audio and video. This exchange is performed in a common area or white board 702 on the user's computer screen. Once the collaboration/discussions are completed, the session members select the Voting booth 704 option and vote on QFD data at step 612. The QFD tabulates the votes and revises the quality matrix or QFD session information to reflect the relative importance of the CTQ attributes and values adopted or approved regarding the session subject. Voting may also be repeated by

the session members in order to reach a consensus if desirable.

[0024] Reverting back to step 606, if the person entering the session decides to facilitate the session, the 'enable drive/facilitation' option is activated at step 614. This allows the person to control the session and direct communications among the members in an organized fashion. The facilitator is able to view the QFD session information at step 616 and manage the progress and pace of the session in a controlled manner at step 618. The facilitator has access to a Facilitation control panel 706 component that allows him/her to edit the QFD data, voting methods, and view the activities of the session members at step 620. In the event that the creator of the session has elected not to facilitate, he/she may still access the facilitation control panel (following step 610) as reflected in FIG. 6. The results of the session are archived in a computer storage location at step 622 and scorecards are electronically initiated at step 624. Scorecards contain the key control parameters to be monitored for a given scenario.

[0025] Once archived in the scorecards in a data storage location, houses of quality can be drilled down to subsystems. A dashboard indicating the top level CTQs sits on top of the house of quality and is affected by changes in the CTQs of the relative subsystems. Users can define simple functional relationships between what is in the dashboard and the rest of the scorecards. Users can view this dashboard and can add CTQs to that dashboard independent from the QFD or in addition to it.

[0026] In an exemplary embodiment, the lightweight server executes an application program to facilitate QFD sessions. The user system may be implemented using a personal computer or a host attached terminal. If the user system is a personal computer, the processing and storage described herein may be shared by the user system and the lightweight server in any manner known in the art (e.g., by providing an applet to the user system).

[0027] The network may be any type of known network including a local area network (LAN), a wide area network (WAN), an intranet, or a global network (e.g., Internet). The user systems, data storage devices, same-time server, and lightweight server may be in communication via multiple networks (e.g., intranet and Internet) so that it is not necessary for all user systems and data storage devices to be coupled to the servers through the same network. The user systems, data storage devices and the servers

may be connected to the network in a wireless fashion and the network may be a wireless network. In one embodiment, the user system executes a user interface application (e.g., web browser) to contact the servers through the network. It will be understood that multiple servers may be used to implement the real time collaboration server functions, object exchange, and scheduling functions.

[0028] The data storage component can be implemented using a variety of devices for storing electronic information such as a file transfer protocol (FTP) server. It is understood that these devices may be implemented using memory contained in the real-time server or user system or that they may be on separate physical devices. The data storage device includes QFD data, session archives, and other similar information. The real time server may also operate as a database server and coordinate access to QFD data on behalf of user systems utilizing replication capabilities or other known methods.

[0029] As described above, the embodiments of the invention may be embodied in the form of computer-implemented processes and apparatuses for practicing those processes. Embodiments of the invention may also be embodied in the form of computer program code containing instructions embodied in tangible media, such as floppy diskettes, CD-ROMs, hard drives, or any other computer-readable storage medium, wherein, when the computer program code is loaded into and executed by a computer, the computer becomes an apparatus for practicing the invention. An embodiment of the present invention can also be embodied in the form of computer program code, for example, whether stored in a storage medium, loaded into and/or executed by a computer, or transmitted over some transmission medium, such as electrical wiring or cabling, through fiber optics, or via electromagnetic radiation, wherein, when the computer program code is loaded into and executed by a computer, the computer becomes an apparatus for practicing the invention. When implemented on a general-purpose microprocessor, the computer program code segments configure the microprocessor to create specific logic circuits.

[0030] While the invention has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope



of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims.